Worksheet 11

Problem 1

a) The sample space consists of all posible events. Each event consists of a pair of actions, tossing a coin then rolling a die. The sample space becomes

$$S = \{(H,1), (H,2), (H,3), (H,4), (H,5), (H,6), (T,1), (T,2), (T,3), (T,4), (T,5), (T,6)\}$$

b) Let E denote the event where a head is tossed & an even is rolled.

Then $E = \{(H,2), (H,4), \{H,6\}\}$

Problem 2

a) $S = \{ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE, CDE\}$

Since order doesn't matter $n(S) = C(5,3) = \frac{5!}{3!2!} = \frac{\cancel{1.2.3}.4.5}{\cancel{1.2.3}\ 1.2} = 10$

on a side note

b) There are 6 sample points ~~events~~ in the sample space that include A as a prize

c) There are 3 sample points in the sample space that have A&B simoltaneously

d) There are 3 that contains A & not B & 3 that contain B & not A.
In total there are 6 that have A & B, but not both

Problem 3

$$P(A) = \frac{\#\text{ of people who recieve A's}}{\#\text{ of people}} = \frac{4}{40} = .10$$

$$P(B) = \frac{\text{\# of people who recieve B's}}{\text{\# of people}} = \frac{10}{40} = .4$$

$$P(C) = \frac{\text{\# of people who recieve C's}}{\text{\# of people}} = \frac{18}{40} = .45$$

$$P(D) = \frac{\text{\# of people who recieve D's}}{\text{\# of people}} = \frac{6}{40} = .15$$

~~P(E) = #~~

$$P(F) = \frac{\text{\# of people who recieve F's}}{\text{\# of people}} = \frac{2}{40} = .05$$

Problem 4

Since the order doesn't matter, there are $C(5,2) = \frac{5!}{2!\,3!} = 10$ possible pairs to ~~be interview~~ move to the next round of interviews. So our sample space is given by

$$S = \{ab, ac, ad, ae, bc, bd, be, cd, ce, de\}$$

a) $P(\text{include a}) = \frac{\text{\# of pairs that include a}}{\text{total pairs}} = \frac{4}{10} = .4$

b) $P(\text{include a \& c}) = \frac{\text{\# of pairs that have a and c}}{\text{total pairs}} = \frac{1}{10} = .1$

c) $P(\text{include d and e}) = \frac{\text{\# of pairs that have d and e}}{\text{total pairs}} = \frac{1}{10} = .1$

Problem 5

Since Transactions are listed as a percentage, we may think of the percentage as the number of occurences out of one hundred. For example 37% of people use checks. We may think of this as 37 out of 100 people use checks. Each of the events listed are mutually exclusive (i.e. don't occur at the same time) so we ~~way~~ may add probabilities

a) $P(\text{credit card or debit/ATM card}) = P(\text{credit card}) + P(\text{debit/ATM card})$

since events are mutually exclusive. $= .25 + .15 = .4$

b) $P(\text{cash, but not check, credit card, debit/ATM})$

$= P(\text{cash}) + P(\text{other})$

$= .14 + .9 = .23$

Problem 6

a) The assertion is false. Let S denote the sample space of rolling a die. So $S = \{1, 2, 3, 4, 5, 6\}$, where $\{1\}$ is rolling a one, $\{2\}$ is rolling a two, and so on. $P(1) = P(2) = \quad = P(6) = \frac{1}{6}$.

$P(1) + P(2) + P(3) + P(4) + P(5) + P(6) = 6 \cdot \frac{1}{6} = 1$. The assertion says the sum should be greater than zero or ~~et~~ less than one.

b) Since all events are simple

$P(E) = P(s_1) + P(s_3) + P(s_5) = \frac{1}{n} + \frac{1}{n} + \frac{1}{n} = \frac{3}{n}$

So the assertion is True